UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/532,855	10/06/2005	Guenter Hoenig	10191/4208	1938

26646 7590 07/23/2009

KENYON & KENYON LLP
ONE BROADWAY
NEW YORK, NY 10004

EXAMINER	
BERNSTEIN, DANIEL A	
ART UNIT	PAPER NUMBER
3743	
MAIL DATE	DELIVERY MODE
07/23/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/532,855	HOENIG ET AL.	
	Examiner	Art Unit	
	DANIEL A. BERNSTEIN	3743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 May 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *21-27 and 44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *21-27 and 44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 April 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 21-22 and 24-25 and 27 rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,003,305 to Martin et al. in view of US 5,932,885 to DeBellis et al. and US 4,995,807 to Rampley et al.

In reference to claim 21

Martin discloses a method for operating an afterburner device for the afterburner device (thermal oxidizer 10a) having a nozzle for metering in at least one of fuel (end of supplemental fuel tube 45), residual gases (residual gases from incomplete combustion enter through inlet 17, Fig. 1), and air (air supply tube 44), into a combustion chamber (inside of 10a) that is filled at least in part with foamed ceramics (media 14a made of ceramic foam material, Col. 21 lines 50-55), and having a discharge opening (outlet 19) for discharging combustion gases, the method comprising: recording (combustion control loops inherently store or "record" values measured by a sensor) a speed of combustion (temperature sensors 30 detect the reaction wave and communicates with the control system adjusting the flow of exhaust gases, Col. 4 lines 51-57 and Col. 10 lines 7-23) in at least one of the combustion chamber (sensors 30 are located in the

chamber as shown in Fig. 1) and the foamed ceramics (30 is in communication with the foamed ceramics in 14a).

Martin does not teach recirculating at least a part of the combustion gases to a heat exchange channel that is thermally coupled to at least one of the combustion chamber and the foamed ceramics; regulating a quantity of the recirculated combustion gases as a function of the recorded speed of combustion.

DeBellis teaches recirculating at least a part of the combustion gases for the purpose of heating incoming combustion air (see Fig. 4 where combustion gases burned in 104 are directed through a recuperator channel 112 and used to preheat incoming combustion air in channel 14), to a heat exchange channel that is thermally coupled to at least one of the combustion chamber (heat transfer would inherently occur through combustion chamber wall 146 and exhaust gases flowing through channel 112) and the foamed ceramics;

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to combine Martin with DeBellis and Brady for the purpose of having an afterburning device that recirculates exhaust gases for the purpose of transferring heat to the main combustion chamber in response to a low combustion temperature. Martin teaches heating the matrix bed with a pre-heater that heats the matrix to stabilize the reaction wave (Col. 9 lines 38-63). It would have been obvious to combine Martin and DeBellis, because preheating a matrix is well known and heating a combustion chamber by recirculating exhaust gases is also well known as

evidenced by DeBellis. Heating the matrix using a resistive heating element or recirculated gases would be obvious equivalents producing expected results. It would have been obvious to combine Martin in view of DeBellis with Brady to control the amount of exhaust gases recirculated, because preheating combustion air with exhaust gases, which helps increase efficiency and reduce nitrous oxide emissions, can be optimized with a control valve (valve 24 in Fig. 2 stops recirculating gases, Brady). Controlling the amount of exhaust flowing through heat exchange tubes is obvious, because it would be equivalent to turning current on/off when pre-heating the chamber with a resistive heating element. All of the claimed elements were known in prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

Rampley teaches a flue gas recirculation system which regulates a quantity of the recirculated combustion gases as a function of the recorded speed of combustion (see Col. 5 lines 5-26). Rampley addresses the problem of undiluted fuel gas raising the speed of combustion and thereby raising the flame temperature which causes increased emissions of nitrous oxide and carbon dioxide. To fix this well known problem, Rampley teaches that by recirculating a portion of the flue gases and diluting the incoming fuel, it is possible to reduce the speed of combustion which directly correlates the flame temperature. Rampley teaches a blower 136 which diverts a portion of the flue gas into which is regulated by valve 138 which may be automatically or manually controlled (also see Col. 6 lines 29-50).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to combine Martin with Rampley for the purpose of controlling the recirculation of flue gases based on the speed of combustion. It is well known to someone of ordinary skill in the art that high temperature flames in burners burn fuel very efficiently, but at the same time cause increased nitrous oxide emissions. There has been a long felt need in the art to reduce noxious chemical emissions in burners without reducing the burner efficiency. One practical way in reducing the noxious chemical emissions is to slow the speed of combustion. It is well known that the speed of combustion in burners is directly proportional to the flame temperature. Rampley teaches that one method to reducing noxious chemical emissions in a burner is to slow the speed of combustion by diluting incoming fuel with recirculated flue gases. Therefore, it would have been obvious to combine Martin with Rampley to reduce and control the speed of combustion by regulating the amount of flue gas recirculation.

In reference to claim 22

Martin in view of DeBellis and Rampley discloses the method as recited in claim 21, wherein the recording step includes measuring a temperature (temperature sensors 30, Col.10 lines 24-37, Martin).

In reference to claim 24

Martin in view of DeBellis and Rampley discloses the method as recited in claim 21, wherein the quantity of the recirculated combustion gases is regulated based on the speed of combustion in the at least one of the combustion chamber and the foamed

ceramics (Martin teaches a heater 28 that preheats the matrix to establish a stable matrix temperature and a control system 33 that monitors the temperature of the matrix. The combination of Martin in view of DeBellis and Brady replaces the heater 28 with recirculated exhaust gases and therefore, the amount of recirculated gases would regulate the pre-heating of the combustion chamber. The speed of combustion as recited in the specification is based off the recorded temperature).

In reference to claim 25

Martin in view of DeBellis and Rampley discloses the method as recited in claim 21, further comprising: regulating a supply of the at least one of the fuel, residual gas, and air, as a function of the recorded speed of combustion (controller 32 controls the flow rate of engine exhaust stream 4 and supplemental fuel stream 5, Col. 10 lines 24-37, Martin. The combination of Martin in view of DeBellis and Brady teaches regulating the exhaust stream to pre-heat the combustion chamber. The speed of combustion, as recited in the specification, is based off the recorded temperature).

In reference to claim 27

Martin in view of DeBellis and Rampley discloses the method as recited in claim 21, further comprising: electrically heating at least one of the combustion chamber and the foamed ceramics (resistive heating element, Col. 9 lines 38-63, Martin).

3. Claim 23 rejected under 35 U.S.C. 103(a) as being unpatentable over Martin in view of DeBellis, Rampley and US 6,422,745 to Glasheen et al.

In reference to claim 23

Martin in view of DeBellis and Rampley discloses the method as recited in claim 22, wherein the temperature is measured, but does not teach that the sensor measures temperature via an infrared light measurement. Martin discloses an optical temperature sensor (Col. 10 lines 15-16).

Glasheen teaches a flame sensor that uses infrared light measurement to detect combustion temperature (Col. 1 lines 15-20).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use an infrared sensor as taught by Glasheen to detect the temperature of combustion in the matrix bed of Martin. There are only so many known options to one of ordinary skill in the art to measure temperature in a combustion chamber. Glasheen teaches that using an infrared sensor to measure combustion temperature is known to one of ordinary skill in the art. Therefore, it would have been an obvious design choice to use an infrared temperature sensor in the matrix bed of Martin based on the temperature range of combustion within the chamber.

In reference to claim 44

Martin in view of DeBellis and Rampley discloses the method as recited in claim 21, further comprising: regulating a proportion of the recirculated combustion gases by changing a quantity of the recirculated combustion gases (Rampley teaches changing the quantity of recirculated combustion gases by diverting some of the flue gases into 134 with blower 136 and supplying a controlled amount to the burner via valve 138, see

Fig. 3 and 4, Fig. 4 shows the amount of nitrous oxide reduced from increasing the flue gas percent of mixture).

4. Claim 26 rejected under 35 U.S.C. 103(a) as being unpatentable over Martin in view of DeBellis, Rampley and US 3,898,317 to Hemsath et al.

In reference to claim 26

Martin in view of DeBellis and Rampley discloses the method as recited in claim 25, but does not teach that at too high a temperature or too great a speed of combustion, a supply of air is increased.

Hemsath teaches that at too high a temperature or too great a speed of combustion, a supply of air is increased ("when a preset temperature is exceeded, additional air is added to reduce the temperature of the gas", abstract, Hemsath).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to combine Martin in view of DeBellis and in view of Brady with Hemsath for the purpose of maintaining a constant temperature in an afterburner. It is well known in the art to increase/decrease airflow to an afterburner to maintain nearly stoichiometric combustion. It is well known in the art to increase the amount of excess air (air in excess of the theoretical stoichiometric quantity for complete combustion of the oxidant and fuel) in order to control the temperature of the combustion chamber as taught by Hemsath. Therefore increasing the supply of air in response to an increase in temperature in the combustion chamber would have been obvious because the claim as recited is a predictable solution to a known problem with

a reasonable expectation of success. Increasing the flow of air above stoichiometric levels would eventually lead to a cooling of the chamber.

Response to Arguments

5. Applicant's arguments with respect to claim 21-27 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL A. BERNSTEIN whose telephone number is (571)270-5803. The examiner can normally be reached on Monday-Friday 8:00 AM - 5:00 PM EDT.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Rinehart can be reached on 571-272-4881. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DAB

/Kenneth B Rinehart/
Supervisory Patent Examiner, Art Unit 3743